

Final Technical Report, AFOSR-F49620-94-1-0164

Equipment for In-Situ Studies of Metal on III-IV Semiconductors

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This supplemental grant was used to purchase a badly needed workstation for modeling of quantitative electron diffraction patterns from surfaces. The equipment purchased was an Hewlett-Packard 715/75 workstation. For reasons which are not completely clear, this computer ended up costing \$58.78 less than the quote from Hewlett-Packard upon which the proposed budget was based.

In addition to providing additional computing power for calculating diffraction patterns from surfaces (see references [1-3]), it also opened up completely new areas. Perhaps the most exciting of these is computer intensive image filtering based around Wiener filters [4-5] which have allowed us to directly resolve atomic surface structures at a resolution of better than 0.25 nm [1,3,6]. We have also used these new filter methods of image restorations in a very large number of cases for work both directly supported by AFOSR and by other agencies. It is realistic to state that with these filters we have almost completely abandoned dark-room chemical printing for digital processing of images, at a substantial long-term reduction in costs.

References

1. Atomic Structure of Si(111)-(5x2) Au from HREM, χ^2 Electron Diffraction and Heavy Atom Holography
L. D. Marks and R. Plass, Submitted to Phys. Rev. Letts.
2. UHV Transmission Electron Microscopy Structure Determination of the Si (111) $\sqrt{3}\times\sqrt{3}$ R30 Au Surface.
R. Plass and L. D. Marks, Submitted to Surface Science.
3. Atomic Structure of the Si(100)-5x3 Au Surface
G. Jayaram and L. D. Marks, Submitted to Surface Science
4. Wien-filter Enhancement of Noisy HREM Images
L. D. Marks, Submitted to Ultramicroscopy
5. On CTF Inversion for Noisy HREM Images: A Solution But Problems
L. D. Marks, R. Plass and G. Jayaram, in preparation

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1995 JUL 13 1335

6. Unusual island structures in Ag growth on Si(100)-2x1
Physical Review B51, 10167 (1995).
N. Doraiswamy G. Jayaram and L. D. Marks.

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
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Distribution /	
Availability Codes	
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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. AGENCY USE ONLY (Leave blank) 2. REPORT DATE 3. REPORT TYPE AND DATES COVERED
FINAL 15 Feb 94 To 14 Feb 95

4. TITLE AND SUBTITLE
EQUIPMENT FOR IN-SITU STUDIES OF METAL ON III-V SEMICONDUCTORS

5. FUNDING NUMBERS
F49620-94-1-0164
61102F
2303/BS

6. AUTHOR(S)
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8. PERFORMING ORGANIZATION
AFOSR-TR-95
0474

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AFOSR/NL
110 Duncan Ave Suite B115
Bolling AFB DC 20332-0001
Capt Hugh De Long

AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

DTIC
SELECTED
JUL 31 1995
F

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release;
distribution unlimited.

12b. DISTRIBUTION CODE
F

13. ABSTRACT (Maximum 200 words)
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DTIC QUALITY INSPECTED 5

14. SUBJECT TERMS 15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT (U) 18. SECURITY CLASSIFICATION OF THIS PAGE (U) 19. SECURITY CLASSIFICATION OF ABSTRACT (U) 20. LIMITATION OF ABSTRACT (U)